BR 33003/27

ENGLISH ELECTRIC
D.3167 - D.3336

350 H.P. DIESEL ELECTRIC SHUNTING LOCOMOTIVES
ENGLISH ELECTRIC CO. EQUIPMENT AND ENGINE
NOS. D.3167 - D.3336

LOCOMOTIVE DATA

Type	0-6-0
Weight in running order	48 tons
Tractive effort	35,000lbs.
Wheel base	11ft. 6ins.
Wheel diameter	4ft. 6ins.
Width overall	8ft. 10ins.
Length overall	29ft. 3ins.
Height overall	12ft. 8⅝ins.
Minimum curve negotiable	3½ chains
Maximum speed	20 m.p.h.

	Main	Service	Total
Fuel tanks	585 gallons	83 gallons	668 gallons
Lubricating oil sump	45 gallons		

	Radiator	Engine	Total
Cooling water	90 gallons	50 gallons	140 gallons

Brakes	Compressed air and hand brake on locomotive. Vacuum brake equipment provided to work fitted stock and giving proportional air braking on the locomotive when so working.
Sanding	Compressed air operated.

POWER EQUIPMENT

6-cylinder diesel engine	English Electric type 6KT. 400 h.p. at 680 r.p.m.
Cylinder bore and stroke	10in. x 12in.
Firing order	1, 5, 3, 6, 2, 4.
Fuel injector nozzle type	C.A.V. B.D.L. 150 T.622.
Fuel injector holder type	C.A.V. B.K.B. 200 T.45b.
	Note : Some locomotives are fitted with Bryce injectors and fuel pumps.
Pressure at which fuel injector should be set	2,500lbs./sq.in.
Fuel pumps	C.A.V. B.P.F. I.C. 120 A.S. 671.
Main generator	D.C. self-ventilated 6 pole E.E.Co. type E.E. 801/11E. 1 hr. rating, 500 amps, 430 volts, 215 kw. at 680 r.p.m.
Auxiliary generator	D.C. self-ventilated 4 pole E.E.Co. type E.E. 736/4E. 1 hr. rating, 180 amps, 90 volts, 16.2 kw. at 1930 r.p.m.
Traction motors	D.C. force ventilated 4 pole E.E.Co. type E.E. 506/7C. 1 hr. rating, 2 x 152 h.p., 325 amps, 400 volts at 850 r.p.m.
Traction motor gearing	Double reduction, ratio 23.9 : 1.
Battery:	
Nos. D.3167 - D.3244	D.P. type D.S.K.A. 108 lead acid 40 cell 108 amp/hr.

Nos. D3245 - D3336	..	D.P. type R.S.K.A. 92 lead acid 40 cell 92 amp/hr.
Lighting circuits	..	85 - 90 volts.
Radiator fan	..	" V " belt driven.
Traction motor blower	..	" V " belt driven.
Air compressor	..	Westinghouse type D.H. 16, motor driven.
Exhausters	..	Westinghouse type 3V72, motor driven.

DRIVERS' DAILY DUTIES WHEN IN SERVICE

1. Check oil level in diesel engine sump.
2. Check water level in radiator.
3. Check quantity of fuel oil in main and service tanks, also fill service tank with hand transfer pump once each shift.
4. Turn handles of **FUEL** filters one complete turn every 8 hours.
5. Blow down compressed air reservoir once every 8 hours and empty waste tank.
6. Lubricate all axle box guides, coupling rods, buffer rams, hand brake column and rotating arm slide and sleeve of mechanical drive to speedometer gearbox, where fitted, once in 24 hours.
7. Examine and, if necessary, fill sand boxes. Check operation once in 24 hours.
8. Inspect lubricating oil, fuel oil and water systems for leakage.
9. Examine brakes and brake gear.
10. Check that detonators, etc., are complete.
11. Check that the fire fighting equipment is intact.
12. Make a short inspection of the locomotive and equipment at a convenient time and check that the apparatus generally is in good working condition.
13. Check that the main switch controlling the exhausters for vacuum braking is set to one of the following positions:—
    (a) " OFF " when running light or when working non-vacuum fitted stock.
    (b) " ON " when working vacuum fitted stock (see instructions under " Running "). The exhausters will not run if the diesel engine is stopped.
14. Report all known defects at the end of each shift.
15. **When starting up a locomotive that has been standing out of service for a period exceeding 24 hours, the following additional procedure should be observed (particularly after repairs at a Motive Power Depot):—**
    (a) Check that the Master Controller and reverser are " OFF " and that the hand brake is " ON."
    (b) Check that the Series/Parallel switch is in the " PARALLEL" position.
    (c) Check that the fuel supply valve from the service tank is open.
    (d) Make a further inspection of the lubricating oil, fuel and water systems for signs of leakage after engine is started.
    (e) Operate the lubricating oil hand priming pump until a pressure of 15lbs./sq.in. is recorded on the oil pressure gauge.

NOTE: All pipes are coloured for identification.

Colour of Pipes

Cooling water	Blue
Fuel oil	Brown
Lubricating oil	Green

Compressed air	White
Vacuum	White (stamped "V")
Engine air intake and exhaust pipes	Aluminium
Electrical conduits	Yellow
Drains	Black

STARTING THE ENGINE

1. Close the battery isolating switches.
2. Insert key into Master Key switch, turn to "START" position and release when the engine fires.
   NOTE: Under no circumstances must the Master Switch be kept in the "START" position if the diesel engine fails to turn over. If the engine turns, but does not fire almost immediately, and no cause is apparent to the driver, the matter must be reported.
3. Check oil pressure gauge; it should register at least 10lbs./sq.in.

EMERGENCY PROPULSION STARTING

If it is not possible to start the diesel engine in the normal manner because the battery is discharged, the following procedure should be adopted:—

(**N.B.**: A length of line about 30 yards long MUST BE sanded before attempting a propulsion start and maintenance staff representatives should always be present).

1. Obtain the use of another locomotive (diesel or steam) to tow or propel the dead locomotive, ADVISING THE DRIVER THAT A SPEED OF 4 m.p.h. MUST NOT BE EXCEEDED.
2. Close the dead locomotive's battery isolating switches.
3. Place the Series/Parallel switch in the "PARALLEL" position. No attempt should be made to start if the switch is in the "SERIES" position.
4. Place the emergency starting switch in the "EMERGENCY STARTING" position.
5. Move the Master Key switch to the "ON" position.
6. Move the reverser handle to the position opposite to the direction in which the locomotive is to be pushed or pulled.
7. Leave the Master Controller OFF.
8. Fit the motor contactor operating rod into the lifting lever socket on the left-hand side of one of the contactors.
9. Operate the lubricating oil hand priming pump until at least 15lbs./sq.in. is obtained.
10. Close one of the motor contactors by lifting the hand operating rod as far as it will go, and keep it in this position (while the locomotive is being towed) until the engine fires. If the engine does not fire at the first attempt, DO NOT OPEN the motor contactor until the locomotive is stationary.
11. Instruct the driver of the assisting locomotive to move in the arranged direction.
12. When the engine fires, lower the motor contactor operating rod sharply. Remove it from the socket and signal the assisting locomotive driver to stop.
13. Move the reverser handle to the "OFF" position.
14. Return the emergency starting switch to the "NORMAL RUNNING" position.

15. Uncouple the assisting locomotive.

NOTE: If the battery is too low to operate the governor valve solenoid, the valve must be held open by operating the push rod by hand.

RUNNING

1. Place the Master Key switch to " ON."
2. Put the reverser lever in the " FORWARD " or " REVERSE " position according to which direction it is desired to run.

   NOTE: Running with the radiator ahead is " Forward " movement; with the cab ahead is " Reverse " movement.

3. Before attempting to move the locomotive make sure that the air main reservoir pressure is between 60 and 80lbs./sq.in., then with the Deadman's pedal depressed make an air brake emergency application followed by a release and check that the brake cylinder pressure is equal to the main reservoir pressure. Then make a second application to hold the locomotive.
4. Release the hand brake, also the air brake, then operate the Master Controller handle as shown under item 8.
5. When running light engine and when working non-vacuum fitted stock, the vacuum exhauster MUST BE SWITCHED OFF and the air brakes controlled by the AIR BRAKE VALVE ONLY.
6. When working vacuum fitted stock the following instructions apply:—
   (a) Place the vacuum exhauster main switch to the " ON " position.
   (b) See that the air brake valve is in the " OFF " position and the vacuum brake valve in in the " Running " position. Check that 21 inches of vacuum is obtained. (25 inches in the Western Motive Power area).
   (c) If a quick release of the vacuum brake is required, move the driver's brake valve handle to the " OFF " position and depress the trigger on the top of the handle.
   (d) The application of the vacuum brake valve will give a proportional application of the air brake on the locomotive, but the air brake valve will NOT operate the vacuum brake.

   When finished with the vacuum brakes after working vacuum fitted stock, the following procedure should be carried out before again moving the locomotive:—
   (e) Place the vacuum brake valve to " ON " position.
   (f) Place air brake valve to the " ON " position.
   (g) Stop vacuum exhausters by placing the switch to the " OFF " position.
   (h) Release vacuum from the chamber side by operating the release valve in the cab.
   (i) When all the vacuum is destroyed, return air brake valve to " Release " position, then make an emergency application followed by a release and check that this is indicated on the air brake gauge.
7. On locomotives fitted with a Series/Parallel Changeover switch the following instructions must be observed:—
   THE SERIES/PARALLEL SWITCH MUST NOT BE OPERATED UNTIL THE MASTER CONTROLLER IS IN THE " OFF " POSITION, THE LOCOMOTIVE STATIONARY AND THE REVERSER AT " OFF "

When working heavy trains up steep gradients, e.g., hump yards, it may be necessary to connect the traction motors in series, and instructions covering particular yards will be issued by the Motive Power Superintendent concerned.

The normal procedure if series connections are required will be:—

With the locomotive at rest, place the Series/Parallel Changeover switch into the " Series " position before starting to shunt.

At the completion of each shunt, the Series/Parallel switch should be returned to the " Parallel " position before commencing the run-round, if this is an advantage.

When in series the maximum speed of the locomotive should not exceed 10 m.p.h. with the controller in a power notch and the main ammeter readings should not normally exceed 400 amps, except for momentary kicks up to 500 amps.

For ALL other duties, and when stabling the locomotive, this switch must be in the " PARALLEL" position.

8. Move the Master Controller handle to notch 1 and pause slightly to allow the contactors to close, then the controller handle may be moved throughout its range until the necessary power is obtained.

The controller handle should be moved towards notch 3. Between notches 1 and 2 there is no change in the engine speed, but between 2 and 3 there is a continuous change in engine speed in proportion to the amount of controller handle movement. Movement of the controller towards notch 3 should continue until the desired locomotive speed is obtained.

If notch 4 is used, extra power will be obtained, provided conditions of track and load are suitable, otherwise no change will occur. The change, if made, will be automatic. Notch 4 may be retained as long as desired, provided the main generator current is below 500 amps.

If the main generator current exceeds 500 amps on notch 4, the controller MUST be returned to notch 3 to avoid overloading the engine.

When working, the main generator current should not normally exceed 800 amperes, except for momentary kicks up to 900 amperes during acceleration.

9. If the driving wheels slip, return the controller handle to " OFF " position and notch up more slowly. If slipping still occurs, return controller handle to " OFF," drop sand on the rails, and again notch up slowly. DO NOT OPERATE SANDERS WITH CONTROLLER IN A POWER NOTCH, OR WHILE THE WHEELS ARE STILL SLIPPING. DO NOT APPLY THE BRAKE TO PREVENT THE WHEELS FROM SLIPPING.

10. **High Water Temperature**

If the temperature of the cooling water exceeds 180°F, the driver must bring the locomotive to rest as soon as possible and investigate. See " Faults and their possible Causes."

11. **Low Oil Pressure**

The engine is automatically stopped in the event of a lubricating oil pressure failure. The interruption of the oil supply to the governor by an electrically operated valve is the normal way of stopping the engine, therefore an electrical failure, e.g., control fuse blown, will also have the effect of stopping the engine.

If the lubricating oil pressure is too low, it is possible that the filter is partly choked. Where duplex filters are fitted the standby filter should be brought into operation by the changeover handle pro-

vided and the matter reported at the end of the turn of duty.

12. **Brakes and the Deadman's device**

The brake must NOT be applied while the Master Controller is in a power notch.

If the Deadman's pedal is released when the Master Controller is in a power notch, power is cut off and an emergency brake application is automatically made after a short delay. The diesel engine continues to run.

To reset the Deadman's pedal the following action must be taken:—

(a) Return the controller to " OFF."
(b) Depress the Deadman's pedal.
(c) Make an emergency air brake application followed by a release.

13. **Protection Relay (Overload and Earth Fault)**

If the protection relay operates during normal running and power is thus cut off, return the controller to notch 1. Make a slight pause, then move the controller towards the position in which it was when the relay operated. If the current rapidly approaches and exceeds the maximum permitted value (see Items 7 and 8), the relay had probably operated due to:—

(a) Overload due to too rapid notching up.
(b) Excessive load on the locomotive.
(c) Partial brake application with the controller in a power notch.

If the relay again operates but without undue rise of current, an earth fault is the most probable cause. In this case, open the sealed earth switch and, if considered necessary, the locomotive can then be driven clear of running roads and taken out of service. The matter must be reported at once to the Motive Power Depot.

TO STOP THE LOCOMOTIVE

1. Return the controller to " OFF."
2. Apply brake.

TO STOP THE ENGINE

1. Return the reverser to " OFF."
2. Move the Master Key switch to " OFF."

NOTE: If, through a fault, the engine continues to run, pull down to the bottom position the fuel rack lever by the governor; this will cut off the fuel supply.

STABLING THE LOCOMOTIVE

In addition to instructions under " To Stop the Engine ":—

1. Apply the hand brake.
2. Open the battery isolating switches.
3. Check that the radiator shutters are closed in cold weather.
4. Check that the Series/Parallel switch is in the " PARALLEL" position.
5. When leaving the locomotive the Master Switch Key must be removed from the Master Switch and handed to the Running Foreman on duty at the depot.

VACUUM BRAKE DEFECTS PROCEDURE

When a test is made in connection with a vacuum brake defect, the following procedure is to be adopted:—

1. With the diesel engine running, check that the vacuum exhausters'

main switch is in the " ON " position and that the exhausters are running.

2. Take the vacuum hose at the leading end off the dummy coupling. Then move the driver's brake valve to the " Brake Off " position, at the same time depressing the trigger release to run the exhausters at high speed. Watch the vacuum gauge and if more than 3 inches of vacuum is obtained it is an indication that there is a stoppage in the system which must be located and removed.
   Replace pipe at the leading end and repeat the operation at the trailing end.
3. Create 21 inches of vacuum* and switch off the exhausters, note the time taken for the vacuum to fall to 12 inches in the train pipe. If this is less than 30 seconds, it is an indication that undue leakage is occurring and this must be found.
4. Restart exhausters, place the driver's brake valve in the " Running " position. Take the hose pipe off the dummy coupling at one end of the locomotive and place the special disc with the 3/16in. leak hole, on the end of the hose pipe.
   Ascertain if 21 inches of vacuum* can be created and maintained.
5. With the hose pipe off the dummy coupling, place the special disc with the ¼in. leak hole on the end of the hose pipe.
   Place the driver's brake valve in the " Brake Off " position and depress the vacuum exhauster high speed trigger. Ascertain if 21 inches of vacuum* can be created and maintained.
   If the vacuum brake is a failure, control of the air brake must be obtained as shown in item No. 6 (e - i) in the " Running " instructions.

*NOTE: Test to 25 inches of vacuum in Western Motive Power Area.

GENERAL NOTES

1. The food warmer *must not* be used unless the engine is running, the Master Controller is at " OFF " and the Master Key switch at " ON."
2. If the locomotive stops for no apparent reason, set the control levers to the " OFF " position and open the battery isolating switches. Report the occurence to the Motive Power Depot.
3. DO NOT REVERSE WHEN THE LOCOMOTIVE IS MOVING.
4. **Oils to be Used**
   See oiling diagram on the locomotive.
5. **Battery Charging**
   Voltage regulators are fitted to these locomotives and are set at 89 volts. This setting MUST NOT be altered by the driver.
   If the battery ammeter is showing a continuous discharge, the engine must be kept running and the matter reported immediately.

METERS AND GAUGES FITTED

1. Battery ammeter.
2. Main ammeter.
3. Circulating water temperature gauge.
4. Lubricating oil pressure gauge.
5. Duplex air brake pressure gauge.
6. Speedometer.
7. Mileage recorder.
8. Fuel gauges (2).
9. Water level gauge.
10. Vacuum brake gauge.